

**Advance Program for
2001 IEEE Topical Meeting on Silicon Monolithic Integrated Circuits in RF
Systems
September 12-14, 2001 in Ann Arbor, Michigan**

September 12, 2001

7:00-9:00 am Registration

8:10-8:20 am Welcoming Comments

8:20-9:40 am Session 1 Low Noise Amplifier Circuits
Session Chair: Robert Plana (LAAS CNRS)

A CMOS Low Noise Amplifier at 2.4 GHz with Active Inductor Load A. Pascht, J. Fischer, and M. Berroth *Institute for Electrical and Optical Communication Engineering, University of Stuttgart, Stuttgart, Germany*

Advanced Design of High Linearity, Low Noise Amplifier for WLAN Using a SiGe BiCMOS Technology J. Sadowsy^{1,2}, J. Graffeuil¹, E. Tournier¹, L. Escotte¹, and R. Plana¹ *LAAS CNRS, Toulouse, France; STMicroelectronics, Crolles Cedex, France*

Design of LNA at 2.4 GHz Using 0.25 μm Technology X. Yang¹, T. Wu¹, and J. McMacken² *University of Central Florida, Orlando, FL, USA; Agere Systems, Inc., Orlando, FL, USA*

CMOS Low-Noise/Driver MMIC Amplifiers for 2.4-GHz and 5.2-GHz Wireless Applications K. Yamamoto¹, T. Heima¹, A. Furukawa², M. Ono³, Y. Hashizume², H. Komurasaki⁴, H. Sato¹, and N. Kato¹ *System LSI Development Center; Advanced Technology R&D Center; Information Technology R&D Center; System LSI Division, Mitsubishi Electric Corp., Japan*

9:40-10:10 am Break

10:10-12:00 Session 2 RF MEMS on Silicon
Session Chair: Rainee Simons (NASA Glenn Research Center, QSS Inc.)

Transceiver Front-End Architectures Using Vibrating Micromechanical Signal Processors (INVITED PAPER) C. T.-C. Nguyen *University of Michigan, Ann Arbor, MI, USA*

Silicon Micromachined Interconnects for On-Wafer Packaging of MEMS Devices A. Margomenos, D. Peroulis, J. P. Becker, and L. P. B. Katehi *University of Michigan, Ann Arbor, MI, USA*

Integration of Thin Film Resonator Devices Onto SiGe Substrates K. Lakin and J. Belsick *TFR Technologies, Inc., Bend, OR, USA*

RF-MEMS Switching Concepts for High Power Applications K. M. Strohm¹, B. Schauwecker¹, D. Pilz², W. Simon³, and J.-F. Luy¹ *DaimlerChrysler Research Center Ulm, Ulm, Germany; DaimlerChrysler Aerospace, Ulm, Germany; IMST GmbH, Kamp-Lintfort, Germany*

Low Voltage High Isolation MEMS Switches P. Blondy¹, D. Cros¹, P. Guillon¹, P. Rey², P. Charvet², B. Diem², C. Zanchi³, and J. B. Quoirin⁴ *IRCOM, Faculté des Sciences, Limoges, France; CEA-LETI, Grenoble, France; CNES, Toulouse, France; STMicroelectronics, Tours, France*

12:1:20 pm Lunch

1:20-3:00 pm Session 3 Passive Components I

Session Chair: Rhonda Franklin Drayton, (University of Minnesota)

Admittance Matrix Calculations of On-Chip Interconnects on Lossy Silicon Substrate Using Multilayer Green's Function H. Ymeri¹, B. Nauwelaers¹, K. Maex², D. De Roest², S. Vandenberghe¹, and M. Stucchi² *ESAT-TELEMIC, Katholieke Universiteit Leuven, Department of Electrical Engineering (ESAT), Leuven-Heverlee, Belgium; The Interuniversity Microelectronics Center (IMEC), Leuven, Belgium*

Novel Low Loss Wide-Band Multi-Port Integrated Circuit Technology for RF/Microwave Applications R. N. Simons¹, K. Goverdhanam^{2,3}, and L. P. B. Katehi³ *NASA Glenn Research Center, QSS Inc., Cleveland, OH, USA; Bell Laboratories, Lucent Technologies, Murray Hill, NJ, USA; Radiation Laboratory, University of Michigan, Ann Arbor, MI, USA*

High Q Inductors and Capacitors on Si Substrate S. Jenei^{1,2}, S. Decoutere¹, S. Van Huylenbroeck¹, G. Vanhorebeek¹, and B. Nauwelaers² *IMEC, Leuven, Belgium; K. U. Leuven, ESAT-TELEMIC, Leuven, Belgium*

Tantalum Nitride Thin Film Resistors for Integration Into Copper Metallization Based RF-CMOS and BiCMOS Technology Platforms R. Henderson¹, P. Zurcher¹, A. Duvallet², C. Happ¹, M. Petras¹, M. Raymond¹, T. Remmel¹, D. Roberts¹, B. Steimle¹, S. Straub¹, T. Sparks², M. Tarabbia², and M. Miller¹ *Materials and Structures Laboratories; RF/IF Device Laboratory; Dan Noble Center, Semiconductor Products Sector, Motorola, Tempe, AZ, USA*

Ground Pattern for Improved Characteristics of Spiral RF Transformers on Silicon K. T. Ng, B. Rejaei, and J. N. Burghartz *Laboratory of Electronic Components, Technology, and Materials (ECTM), DIMES, Delft, The Netherlands*

3:00-3:30 pm Break

3:30-5:00 pm Session 4 Advanced Devices I
Session Chair: Guofu Niu (Auburn University)

Self-Assembled III-V Quantum Dots: Potential for Silicon Optoelectronics
(INVITED PAPER) R. Leon *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA*

SSOI Technology for Integrated Schottky Barrier Diodes H. S. Gamble, P. Baine, M. Bain, B. M. Armstrong, S. J. N. Mitchell, V. F. Fusco, and J. A. C. Stewart *The School of Electrical and Electronic Engineering, Queen's University Belfast, N. Ireland*

High-Frequency Characteristics of PMOS Transistors with Raised SiGe Source/Drain K.-M. Chen¹, H.-J. Huang², G.-W. Huang¹, T.-S. Chao¹, Y.-H. Pai³, and C.-Y. Chang² *National Nano-Device Laboratories, Hsin-Chu, Taiwan, R.O.C.; Department of Electronics Engineering and Institute of Electronics, National Chiao-Tung University, Hsin-Chu, Taiwan, R.O.C.; Department of Materials Science and Engineering, National Chiao-Tung University, Hsin-Chu, Taiwan, R.O.C.*

Monte Carlo Simulations of Submicron SOI-LBJTs A. Yangthaisong¹, G. C. Crow², R. A. Abram¹ *Department of Physics, University of Durham, Durham, UK; Corning Research Center, Adastral Park, Ipswich, UK*

5:00-6:30 pm Reception

6:30 pm Banquet

September 13, 2001

8:20-10:00 am Session 5 Reliability of RF Silicon Devices
Session Chair: John D. Cressler (Auburn University)

Mechanical Stability and Handling-Induced Failure of Micromachined Wafers for RF Applications A. Polyakov, M. Bartek, and J. N. Burghartz *Delft University of Technology, ECTM-DIMES, The Netherlands*

Measurement and Modeling of Thermal Resistance of High Speed SiGe Heterojunction Bipolar Transistors J.-S. Rieh, D. Greenberg, B. Jagannathan, G. Freeman, and S. Subbanna *IBM Communications R&D Center, Hopewell Junction, NY, USA*

Thermal Issues in a Backwafer Contacted Silicon-on-Glass Integrated Bipolar Process N. Nenadovic, L. K. Nanver, H. Schellevis, H. W. van Zeijl, and J. W. Slotboom *Laboratory of ECTM, DIMES, Delft University of Technology, The Netherlands*

Long-Term Reliability of Si/Si_{0.7}Ge_{0.3}/Si HBTs From Accelerated Lifetime Testing Z. Ma¹, J.-S. Rieh¹, P. Bhattacharya¹, S. A. Alterovitz², G. E. Ponchak², and E. T. Croke³ *Department of Electrical Engineering and Computer Science, University of Michigan,*

Ann Arbor, MI, USA; NASA Glenn Research Center, Cleveland, OH, USA; HRL Laboratories, LLC, Malibu, CA, USA

Reliability Investigation of SiGe HBTs J. Kuchenbecker¹, M. Borgarino², L. Bary¹, G. Cibiel¹, O. Llopis¹, J. G. Tartarin¹, J. Graffeuil¹, S. Kovacic³, J. L. Roux⁴, and R. Plana¹
LAAS-CNRS, Toulouse, France; Dipartimento di Scienze dell'Ingegneria, University of Modena and Reggio Emilia, Modena, Italy; SiGe Microsystem Inc., Ottawa, ON, Canada; CNES Toulouse, Toulouse, France

10:00-10:30 am Break

10:30-11:40 am Session 6 High Frequency/ Highly Integrated Circuits
Session Chair:

SiGe/Si-Based Optoelectronic Devices for High-Speed Communication Applications
(INVITED PAPER) P. Bhattacharya¹, O. Qasaimeh², and J-S. Rieh³ *Department of Electrical Engineering and Computer Science, The University of Michigan, Ann Arbor, MI, USA; Agere Systems, Breinigsville, PA, USA; IBM Corporation, Hopewell Junction, NY, USA*

38 GHz Coplanar Harmonic Mixer on Silicon W. Zhao¹, C. Schöllhorn¹, E. Kasper¹, and C. Rheinfelder² *Institut für Halbleitertechnik, Universität Stuttgart, Stuttgart, Germany; DaimlerChrysler Research Center, Ulm, Germany*

Design Procedure for Fully Integrated 900 MHz Medium Power Amplifiers in 0.6 µm CMOS Technology on Latchup Resistant EPI-Substrate P. Baureis¹, M. Peter¹, H. Hein², and F. Oehler² *University of Applied Sciences Würzburg, Germany; Fraunhofer Institute for Integrated Circuits Erlangen, Germany*

12:00-1:20 pm Lunch

1:20-2:50 pm Session 7 Advanced Devices II
Session Chair: Johann-Friedrich Luy (DaimlerChrysler Research Center Ulm)

Coherent Transport (INVITED PAPER) S. Luryi *Department of Electrical and Computer Engineering, State University of New York at Stony Brook, Stony Brook, NY, USA*

Resonance Phase Transistor- Concepts and Perspectives H. Jorke¹, M. Schäfer², and J.-F. Luy¹ *DaimlerChrysler Research Center Ulm, Ulm, Germany; CADwalk Design & Simulation, Allmendingen, Germany*

Structure Dependence of the Characteristics of SiGe Varactor Fabricated by RPCVD B. Mheen, D. Suh, and J.-Y. Kang *Department of Compound Semiconductors, Microelectronics Technology Laboratory, Electronics and Telecommunications Research Institute (ETRI), Republic of Korea*

Design Guidelines of Vertical Surrounding Gate (VSG) MOSFETs for Future ULSI Circuit Applications A. Kranti¹, R. S. Haldar², and R. S. Gupta¹ *Semiconductor Devices Research Laboratory, Department of Electronic Science, University of Delhi South Campus, New Delhi, India; Department of Physics, Motilal Nehru College, University of Delhi South Campus, New Delhi, India*

2:50-3:20 pm Break

3:20-4:50 pm Session 8 Advanced Devices III

Session Chair: Samuel Alterovitz (NASA Glenn Research Center)

Progress in Si-Based AlGaN HEMTs for RF Power Amplifiers (INVITED PAPER)

J. R. Shealy *Department of Electrical and Computer Engineering, Cornell University, Ithica, NY, USA*

Power Performance of X-Band Si/Si_{0.75}Ge_{0.25}/Si HBTs Z. Ma¹, S. Mohammadi¹, P. Bhattacharya¹, L. P. B. Katehi¹, S. A. Alterovitz², and G. E. Ponchak² *Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI, USA; NASA Glenn Research Center, Cleveland, OH, USA*

Parasitic Barrier Effects in SiGe HBTs due to P-n Junction Displacement N. Mathur, D. Todorova, and K. P. Roenker *Department of Electrical and Computer Engineering and Computer Science, University of Cincinnati, Cincinnati, OH, USA*

Noise-Gain Tradeoff in RF SiGe HBTs G. Niu¹, J. D. Cressler¹, S. Zhang¹, A. Joseph², and D. Harame² *Electrical and Computer Engineering Department, Auburn University, Auburn, AL, USA; IBM Microelectronics, Essex Junction, VT, USA*

September 14, 2001

8:20-10:00 am Session 9 Passive Components II

Session Chair: Joachim N. Burghartz (Delft University of Technology)

New Analytic Expressions for Mutual Inductance and Resistance of Coupled Interconnects on Lossy Silicon Substrate H. Ymeri¹, B. Nauwelaers¹, K. Maex², S. Vandenbergh¹, and D. De Roest² *ESAT-TELEMIC, Katholieke Universiteit Leuven, Department of Electrical Engineering (ESAT), Leuven-Heverlee, Belgium; The Interuniversity Microelectronics Center (IMEC), Leuven, Belgium*

Novel Vertical Interconnects With 180 Degree Phase Shift for Amplifiers, Filters and Integrated Antennas K. Goverdhanam^{1,3}, R. N. Simons², and L. P. B. Katehi³ *Bell Laboratories, Lucent Technologies, Murray Hill, NJ, USA; NASA Glenn Research Center, QSS Inc., Cleveland, OH, USA; Radiation Laboratory, University of Michigan, Ann Arbor, MI, USA*

Planar Antennas on Silicon for Millimeterwave Emitters K. P. Heppenheimer, L. Vietzorreck, and P. Russer *Institut für Hochfrequenztechnik, Technische Universität München, Munich, Germany*

High Frequency Methods for Characterization of Oxidized Porous Silicon R. L. Peterson¹, I. Itotia², and R. F. Drayton² *Department of Electrical Engineering, Princeton University, Princeton, NJ, USA; Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, MN, USA*

A Folded-Slot Antenna on Low Resistivity Si Substrate with a Polyimide Interface Layer for Wireless Circuits J. Papapolymerou¹, C. Shwartzlow¹, and G. E. Ponchak² *Department of Electrical and Computer Engineering, The University of Arizona, Tucson, AZ, USA; NASA Glenn Research Center, Cleveland, OH, USA*

10:00-10:30 am Break

10:30-11:50 am Session 10 Voltage Controlled Circuits
Session Chair: Helmut Jorke (DaimlerChrysler Research Center Ulm)

A Very Low Phase Noise SiGe VCO at X-Band Frequencies L. Dussopt and G. M. Rebeiz *EECS Department, The University of Michigan, Ann Arbor, MI, USA*

20 mW SiGe-MMIC-VCO at 5 GHz With Integrated 4:1 Divider for use in a PLL P. Abele, H. Vogelmann, E. Sönmez, K.-B. Schad, and H. Schumacher *Department of Electron Devices and Circuits, University of Ulm, Germany*

Design and Implementation of Driver IC for Miniature VC-TCXO Module W.-H. Kwon¹, B.-R. Ryum², and T. S. Fiez³ *Department of Information & Communications, Anyang University, Anyang, Korea; ASB Co., Ltd, Daejeon, Korea; Department of Electrical and Computer Engineering, Oregon State University, Corvallis, OR, USA*

Coplanar SiGe VCO MMICs Beyond 20 GHz H. Kuhnert and W. Heinrich *Ferdinand-Braun-Institut für Höchstfrequenztechnik (FBH), Berlin, Germany*

Closing Remarks